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DRS. ADDINELL HEWSON and CHARLES A. MCCALL were duly elected members of the Department.

The Recorder having stated the necessity of his absence for several months, the Department appointed Dr. ATLEE recorder *pro tempore*.

Nov. 15th. Dr. MITCHELL read the following paper :

On the Inhalation of Cinchonia, and its salts.

BY S. W. MITCHELL, M. D.

There can be very little doubt that at some future time we shall possess the means of giving to patients many potent remedies in the form of inhalation, rather than in the usual way. This is at least among the hopes of the therapist of the present day. Absorption of medicinal substances by the intestinal mucous surface is but too often uncertain, while the passage to the blood through the lungs seems to be always an open track when the agent inhaled is in a state of vapor. How desirable it would be to possess the means of inhaling quinine in the congestive fevers of our malarious districts, we can very well conceive. Guided by these ideas, I have sought industriously for some means of attaining this result, and although I have failed, as I shall here show, in evolving any very marked practical benefit from these researches, I have met with certain facts of such interest that I desire to put them on record as indicating a novel direction for medical thought and action.

At one time, the analogy in chemical composition, between certain of the newly formed ethers and quinia itself, seemed to point out these as fit subjects for therapeutic use and trial. The difficulty of procuring them, obliged me, however, to relinquish effort in this direction, and I turned from them to examine anew the alkaloids derived from cinchona bark. While thus engaged, one of my friends, now Dr. Bill, of the army, pointed out to me in Fresenius's Chemistry, his account of cinchonia, which he describes as volatile at high temperatures.

Struck with this, I searched carefully for any accounts of its inhalation, but as yet have been unable to find in the books on Cinchona any description of inhalation, as a mode of using the alkaloid in question. The last complete work on quinia, by M. Briquet, enumerates many methods of employing the alkaloids and bark, but neither among the means in use, or out of use, is this one alluded to. Occasionally, in disease of the lungs or throat, inhalation of pulverized cinchona bark has been resorted to, and M. Briquet relates,—“*Traité Thérapeutique du Quinquina et de ses préparations*,” p. 118,—that those who work in the storehouses of cinchona bark are sometimes thus cured of malarious fevers. This could only occur through accidental ingestion, and inhalation of the floating particles of bark.

Cinchonia and its salts are the only alkaloids which appear to be volatile by heat. After many experiments, I have finally resorted to the following very simple method of inhaling them:—About forty grains of pure cinchonia, being mixed up with sand, are placed in a capsule, and heated by a spirit-lamp. The sand is useful in diffusing the heat, and preventing too rapid a destruction of the alkaloid. A heat of about 300° melts the particles of cinchonia into a brown fluid, and from this, if the evaporation be carefully managed, the volatilized alkaloid escapes in the form of a gray vapor.

When a microscope glass is held over the capsule, and the heat is too elevated, the cinchonia decomposes, and a dark red gummy-matter, with the odor of burned benzoin, adheres to the glass. A rather lower temperature drives off the cinchonia in a gray vapor, which may be made to redeposit the pure alkaloid upon the interior of a funnel held over it, or upon a microscope slide. The alkaloid thus obtained is in branching needles.

On a number of occasions, I inhaled the vapors of cinchonia, often breathing them for ten or twenty minutes, without much inconvenience, when care

was taken to regulate the supply of heat. The brown or reddish volatile substance which is given off when the heat used is too great, so irritates the throat as to cause nausea, and oblige the patient to cease inhaling.

When carefully inhaled, a part of the alkaloid is deposited on the throat and in the mouth, where its sub-bitter taste is soon perceived. To guard against error, which might arise from swallowing these portions of the alkaloid, I refrained from swallowing whilst inhaling, and frequently rinsed the throat with water.

Upon four occasions, I noted the symptoms caused by the cinchonia thus employed, taking care to allow the excitement of the system produced by the inhalation to pass away before I counted the pulse. In three instances the pulse *fell*, losing from 6 to 10 beats per minute. In the fourth, the pulse remained a few beats above the normal number. The person on whom these experiments were made is liable to still greater depression of cardiac energy, when under the influence of quinia. At first, it was difficult to separate the ordinary signs of cinchonism, from the feelings of cerebral confusion, caused by breathing too rapidly. These sensations, however, were evanescent. At the end of a quarter of an hour, or even less, the head was clear, and within half an hour afterwards the patient felt a quickly increasing headache, with giddiness, and sometimes a feeling as though the brain was swelling into monstrous bulk. These sensations passed away within four or five hours, unless the inhalation was renewed.

Still uncertain as to whether or not the alkaloid entered the blood, I caused a healthy adult, æt. twenty-nine years, to inhale the fumes from forty grains of the heated cinchonia four times in one day. Symptoms of cinchonism were felt only after the first inhalation, which was made at 10 A. M.; at 12 M. the second inhalation took place, and at the same time four ounces of clear urine, s. g. 1023, were passed. The other inhalations occurred in the afternoon and evening, but none other of the urine passed was saved, until 7 A. M. next day.

The first specimen was examined by Bouchardat's test, the iodated iodide of potassium. This reagent gave a faint but decisive brown precipitate of iodide of cinchonia, when employed in the usual way; when, however, I placed in a test tube a portion of the test solution, and slowly poured upon it the lighter wine, a profuse deposit of the iodide announced the presence of cinchonia in the urine. In the usual mode of making this test,—although the precipitate is perceptible enough,—it almost immediately redissolves in the urine, which appears to possess a remarkable power of dissolving the iodides of cinchonia and quinia, since when these precipitates are thrown down from an aqueous solution of a salt of either alkaloid, they are found to be very insoluble. The second specimen of urine contained only traces of cinchonia, and twenty-four hours after the last inhalation no evidence of the presence of the alkaloid in the urine could in any way be obtained.

It will be readily seen from what I have said, that I do not anticipate any remarkably valuable practical results from the new mode of administering cinchonia, in vapor. The want of therapeutic power in this alkaloid, when compared with quinia,—dose for dose,—the difficulty of regulating the heat so as to volatilize, and yet not decompose it, as well as the unpleasantness of the process of inhalation, combine to deprive these experiments of any great practical utility. In a single case of tertian intermittent fever, I employed the inhalation of cinchonia vapor. The patient had no new attack for one month, although no other ulterior measures were employed. The case was a very irregular and uncertain one, and I therefore attach but little faith to this single therapeutic test. I should add that my patient complained a good deal of the effect of the alkaloid upon his glottis and larynx. For a time it altered the tones of his voice very considerably.

In two cases of chronic bronchitis, of long standing, I also used the fumes

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of cinchonia ; one of these dated his first improvement from the use of these inhalations, in which he persisted every other day, for more than two weeks ; no other treatment was used until he had been much aided by the means above described. He learned after a time to employ the cinchonia without my aid. The other patient submitted to one inhalation, but declined any further proceedings of a similar character, declaring, that the remedy was worse than the disease, only shorter. When we are successful in volatilizing the alkaloid without decomposition, the process of inhalation is not very disagreeable ; but when the heat is too high, and the cinchonia becomes altered, it is extremely difficult to continue to breathe it.

The salts of cinchonia are also volatile by heat, but they offer no advantages which do not equally belong to pure cinchonia. The sulphate is quite inadmissible for inhalation use, since sulphuretted gases are given off in small amounts when the heat is too elevated, and decomposition takes place.

Dr. WOODWARD read a paper entitled "Remarks on the Anatomical Marks of Cancer." The Standing Committee on Pathology, to which this paper was referred, reported in favor of its publication in a medical journal to be selected by the author.*

Dr. MITCHELL submitted a short preliminary report on the subject of the changes undergone by the white race in America. The object of this report was, principally, to suggest the proper manner of proceeding in this research. A form of letters to be addressed to different eligible persons, for the purpose of receiving their assistance in making this report, was communicated, with a copy of the table they are desired to fill.

The Committee appointed at a former meeting to prepare a series of tables for the Registration of Diseases, &c., to be used by members of the Department and others, reported that they had performed their duty by adopting the tables submitted to the State Medical Society by Dr. H. HARTSHORNE, and approved by that Association. Owing to want of funds these tables never were published. Mr. PRICE, of this city, is willing to issue these tables in book form at his own expense, and to supply members and others at a slight cost. They will be bound with his visiting list for physicians, and also issued separately. The Committee asked leave to print the approval of the Department, with these tables, and in its name to recommend them to the profession. This report was accepted, and the permission asked was granted.

Dr. WOODWARD submitted the following resolutions, which were adopted :

1. *Resolved*, That every author of a paper hereafter read before the Department, not designed for publication in the Proceedings, shall at the time of reading furnish a full abstract of the same to the Recorder, in order that it may be laid before the Academy with the monthly report.

2. *Resolved*, That Committees having referred to them papers read before the Department, accompanied with illustrations, shall be required to report to the Department whether such illustrations are indispensably necessary for the thorough elucidation of the subject considered; and when in their opinion such a necessity exists, the entire cost of such cuts, engravings or lithographs shall be borne by the Department, on a vote of the majority of the members present at any stated meeting. Provided, that the author shall present at the time an estimate of the cost of such illustrations.

Dec. 6th.—Dr. WALTER F. ATLEE read the following communication upon "*Relaxation of the Abdominal Walls, as a cause of Hæmorrhoids.*"

A cause of hæmorrhoids, at least what we believe may be one, which has been neglected by all writers with whom we are acquainted, is weakness or relaxation of the muscles of the anterior wall of the abdomen.

* See American Journal of Medical Sciences for January, 1859.

In order to understand this it is necessary to reflect a little while upon the peculiarities of the venous circulation in the portal system. From the resistance the blood in the general circulation encounters in traversing the capillaries, much of its moving force is lost, and to move regularly in the veins it requires some assistance, that is obtained chiefly from muscular movements and the aspiratory action of the movements of inspiration; by neither of these is the flow in the portal veins affected. Besides, the portal veins possess no valves, and the blood contained therein is between two systems of capillaries, for these veins act as arteries in the liver, and the blood passes through a capillary network in that organ before it empties into the inferior vena cava. If in passing through the general capillary system, the blood loses nearly the whole of its moving force, it is evident that the capillary system in the liver must act in the same way, and with so much the more power, as that the tension of the blood in the portal vein is already itself less than that in the arteries. In fact, well-known experiments, as for instance those made when the blood of the liver and that of the portal veins are collected for chemical examination, show that the circulation in the vena portarum is an entirely passive one, its current is directed towards the liver only on the one condition that there is a force to push it there, and this force comes from the abdominal walls, which, by pressing the mass of the intestines, propel the blood contained therein. Causes that may locally modify the circulation must, of course, act here with great efficacy, and it is far from being a matter of surprise that the hæmorrhoidal veins, those most exposed, are often enlarged and diseased. Nature, as usual, has made provision for their protection, and were it not for the relief afforded them by the communications existing in the walls of the rectum between the inferior mesenteric vein, and the middle and hæmorrhoidal branches of the hypogastric, they would be still more often affected.

It is very hard to say how far the rapidity of the current of the blood in the portal vein may be diminished, but one experiment is sufficient to show the influence, in this respect, of causes constantly occurring. The ferro-cyanuret of potassium shows itself in the urine as soon as it reaches the general circulation; this salt, when given 24 minutes after a meal appeared in the urine at the expiration of 16 minutes; and when given 240 minutes after a meal, in 2 minutes. In fact when the fatal consequences of the sudden injection into the general venous system of large quantities of even the most innocuous fluids is considered, the necessity of the prevention of the sudden passage into the inferior vena cava of the materials carried into the vena portarum, is at once apparent. Most important chemical changes undoubtedly occur in the liver, but it might be shown, we think, by reasons taken from numbers of facts in normal and pathological anatomy, both human and comparative, as also in physiology, that its action as a mechanical agent is most important. If a few ounces of water suddenly thrown into the general circulation of a dog can produce death, what would be the effect if, in man, the liver did not intervene between the inferior vena cava, and a barrel of lager beer?

Now it being undoubtedly a fact that the pressure exerted by the abdominal muscles upon the mass of intestines is the cause of the onward movement of the blood in the portal veins towards the liver, any cause diminishing the pressure, whether position of the body, or feebleness of the muscles themselves, must lead to more or less stagnation of the blood, and consequently to hæmorrhoidal affections. Tailors, shoemakers, dress-makers, and persons engaged in writing, which forces them to lean forward over a desk, are particularly subject to hæmorrhoids; and we would explain the well-known influence of sedentary occupations generally upon this affection more by their producing relaxation of the anterior abdominal walls, than by the deficiency of exercise and the constipation attending them, though these must play their part also. An undoubted cause of an attack of hæmorrhoids, and one not unfrequently witnessed, is parturition. It is not very uncommon for the patient to suffer most severely

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after the birth of the child, from the strangulation of a mass of hæmorrhoidal veins, that have been forced out with the first passages from the bowels, and the cause of this phenomena we believe to be the relaxation of the abdominal walls at that time existing. Many facts corroborative of this opinion could readily be cited.

Dr. LEIDY called the attention of the members to the stomach of a mink (*Mustela vison*), containing a large number of worms. The latter had caused much thickening of the walls of the stomach, in which the anterior extremity of their body deeply penetrated. The worm is a species, heretofore unnoticed, of the genus *Cheiracanthus*. Its name and characters were given as follows :

CHEIRACANTHUS SOCIALIS, Leidy. Body cylindrical, posteriorly obtuse ; anus subterminal. Integument transparent, with distinct circular muscles. Head discrete, discoidal, furnished with transverse rows of recurved hooks. Mouth bilabiate ; œsophagus clavate, red ; intestine dusky brown. Ovaries and oviducts, or testes and vasa deferentia, very tortuous and white. Anterior portion of the body thickly covered with alternating transverse rows of minute plates, of which those most anterior are tridentate, the succeeding ones bidentate, and the last ones are simple and gradually become obsolete. Posterior extremity of the male attenuated, spirally contorted, and ending in a horse-shoe-like border with four red papillæ on each side.

Length of female fifteen lines ; breadth three-fourths of a line ; length of male twelve lines, breadth half a line.

Dr. WOODWARD stated that a portion of the stomach of the mink was submitted to him for investigation by Dr. LEIDY. The piece presented on the surface of the mucous membrane several orifices about $\frac{1}{4}$ th of an inch in diameter, which were surrounded by well-marked indurations of the size of a chestnut. On making sections of these indurations it was observed that the orifices were the openings of canals penetrating from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch into the tissue, winding in various directions ; one orifice sometimes leading to several canals.

The canals were lined by a reddish pultaceous matter in which blood corpuscles in various stages of disintegration and numerous pus-corpuscles were clearly made out. One or two bodies supposed to be ova were also perceived.

The induration was essentially a new formation of connective tissue in which development had proceeded to the stage of nucleated caudate cells with extremities much prolonged. It involved the sub-mucous tissue and the superficial portion of the muscular coat.

It is presumed that the new formation is the result of the organization of an inflammatory exudation, poured out as the consequence of the disturbance produced by the penetration of the worm into the tissue.

Dr. MITCHELL exhibited an ingenious injecting pump, invented by Mr. FRANKLIN PEALE, of this city. Its valves were in imitation of those in the veins of the animal organism. He also exhibited a craniometer, graduated to 1-50th of an inch, and a spirometer, for measuring lung capacity, much superior to the one ordinarily used.

While engaged recently, in preparing various instruments to be used in physical examinations of the height, weight, and pulmonary capacity of the men of the police force of Philadelphia, Dr. M. was struck with the clumsiness, and, in some instances, with the inefficiency of the ordinary spirometer. Its great size and cumbrous form, the necessity of using many buckets of water to fill it, and the expense of its construction, alike unfit it for common or ready use.

With the aid of his friend, Mr. B. PHILLIPS, and of Mr. GRATZ, he has succeeded in arranging the ordinary "dry gas metre" so as to adapt it perfectly to spirometric use. This beautiful metre is made in vast numbers by Messrs. Code, Hopper & Co., of Philadelphia. It is unnecessary to explain the interior 1858.]

arrangements, which, although complicated, are capable of accurately measuring the cubic amount of the gases which pass through, and it is so little apt to become deranged that it will often run for years without serious error. As the works of the dry metre are made by machinery, and the number manufactured is enormous, the price is of necessity moderate, being from eight to ten dollars, or less than one half of the cost of the worst spirometer, made upon the ordinary plan, and many times less than that of the best of them. This new form of spirometer runs with so little friction that a pressure of 1-8th of an inch of water will move it readily. One source of error is thus avoided, since if the instrument was difficult to move, the air blown into it would be more or less condensed, and so occupy less space than it ought to do.

The number of cubic inches passed through this instrument is marked by hands upon a dial placed on top of the metre. After very careful testing, it was found to give extremely accurate indications. The size of the new spirometer is as follows:—Height 14 inches, width 11 inches. The inlet and outlet pipes form convenient handles.

As the air from the lungs naturally deposits a certain amount of moisture in the metre, its escape is provided for by an aperture at the bottom, usually closed by a button.

The committee to which was referred the Preliminary Report of Dr. S. WIER MITCHELL, relative to the plan by which he purposes obtaining the statistics of height, weight, &c., of the native born white race in North America, reported that upon full and attentive consideration it was the opinion of the committee that the plan proposed by Dr. Mitchell, is such, that if followed out as indicated by him, it cannot fail to lead to results of the highest importance, not only in regard to the development and hygiene of the race in America, but to the solution of certain questions relative to mankind at large, of equal if not of greater consequence. The committee therefore suggested to the Department as a whole, and also to the individual members, the importance of affording to Dr. Mitchell, and to those gentlemen whom he may associate with him in his inquiries, such assistance as may be in their power.

This committee had also referred to it resolutions giving authority to Dr. M. to use the name of the Department in his efforts to obtain the information he desires, and appropriating a sum not exceeding sixty dollars for the necessary expenses of his investigations.

The first and second resolutions are so manifestly proper, that the committee deemed it unnecessary to urge them further.

In relation to the third resolution, the committee desired to offer a few reasons why it should be favorably considered and acted upon by the Department.

In the first place the subject to which Dr. M.'s inquiries relate, is one assigned to him in the report of the General Committee, and therefore not selected by him for voluntary investigation. There is accordingly an obvious propriety, aside from any other reason, in the Department defraying such necessary and moderate expenses as may be incurred.

2d. In order to do full justice to the subject it is essential that numerous circulars, blanks, &c., should be printed and distributed, and that occasionally small sums of money should be given to persons who may have rendered valuable assistance. These are expenses probably not incidental to any other subject proposed by the General Committee, and it would be just as proper that the Recorder should be at the expense of the blanks, circulars, &c., used by him for the Department as that Dr. M. should furnish those required for the performance of the duty assigned to him.

Such necessary apparatus as may be required should also be furnished by the Department. This will of course remain the property of the Department, and may be used in future researches.

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3d. In conclusion, the committee was of the opinion that in general no better use can be made of the funds of the Department, than by employing them in furtherance of such scientific investigations as come within its range of action. It is desirable that this should from the first be made the settled principle of the Department, and the committee believed that means will not be wanting to carry it out.

The committee therefore recommended the adoption of the third resolution, leaving it to the Department to decide whether the amount shall be raised by subscription or appropriated directly from the treasury.

On motion of Dr. HAMMOND, the Department made the following resolutions :—

Resolved, That Dr. M. be appointed a committee of one on the subject of the physical development of the native born white American race, with power to add to the committee such persons as he may think proper.

Resolved, That said committee be authorized to make use of the name of the Department in its inquiries.

Resolved, That said committee be authorized to draw upon the Treasurer for such funds as may be required, not exceeding sixty dollars.

On motion of Dr. HAMMOND, it was resolved that a Committee be appointed to solicit subscriptions, to be paid over to the Treasurer in aid of the investigation, in regard to the statistics of the human race in America.

Mr. FOULKE, a Member of the Committee on Dr. Hartshorne's paper on the relations of Physiology to Palæontology, stated that before the action of the committee, the author was compelled to go to Europe for his health, and he preferred to withdraw his paper. Mr. Foulke, therefore, at his request, asked leave for the withdrawal of the paper, which was granted by the Department.

Dr. E. HARTSHORNE presented a resolution, asking for the appointment of a committee, consisting of five persons, to devise and report upon a plan for securing a wide circulation of the memoirs of the Department among medical readers. The resolution was adopted, and a committee, consisting of Messrs. E. Hartshorne, Hammond, Leidy, Mitchell and Atlee was appointed.

The following persons were chosen as the officers and members of the Standing Committees for the ensuing year :

Director.—Dr. LEIDY.

Vice-Director.—Dr. HAMMOND.

Recorder.—Dr. HARTSHORNE.

Conservator.—Dr. MORRIS.

Treasurer.—Mr. QUEEN.

Auditors.—Mr. SLACK, Mr. SERGEANT and Dr. WURTZ.

Anatomy and Histology.—Drs. LEIDY, SCHMIDT and ATLEE.

Physiology.—Drs. HAMMOND, MITCHELL and MORRIS.

Pathology and Pathological Anatomy.—Drs. WOODWARD, MOOREHOUSE and BAKER.

Organic Chemistry.—Drs. RAND, MORRIS and WILCOCKS.

Micrology.—Drs. BOKER, WOODWARD and MITCHELL.

Embryology.—Drs. ATLEE, CORSE and H. HARTSHORNE.

Etiology and Hygiene.—E. HARTSHORNE, H. HARTSHORNE and S. POWELL.

The Treasurer's Report was read, showing a balance on hand of \$70 36.

December 20th. Dr. S. W. MITCHELL read a paper upon *the effects of certain substances upon the exposed hearts of animals*, which was ordered to be published in a medical journal. The following is an abstract of this paper :

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Dr. MITCHELL's experiments seem to him to justify the following conclusions :—

1st. That the hearts of the frog and turtle beat much less rapidly in vacuo, and sometimes cease to act until the air is readmitted. That the vacuum most probably retards the heart's action by the mechanical effects it induces, as well as by depriving it of oxygen, since the beat in vacuo is long and labored, and the accelerating influence of the readmitted atmosphere is almost instantaneous.

2d. That mere isolation from the air, as by placing the heart in oil, does not alter the rate of the heart's movements for some time, but lessens their ultimate duration.

3d. That water, at aërial temperatures, stimulates the heart, and very soon causes it to cease to pulsate. That water at higher temperatures, as 100° F.,—113° F., produces much more rapidly the same results.

4th. That glycerine, at aërial temperatures, affects the heart but little, except as shortening the time during which it continues to pulsate. That glycerine at 32° F., depresses the heart's action, lessening the number of pulses per minute at least one half, and soon checking its movements altogether. That olive oil at 32° F., affected the heart very little at first, as to the number of beats per minute, but soon rendered them feeble, and finally stopped them; though at the close of a longer interval than was required by glycerine at the same temperature.*

5th. That when the heart has ceased to respond to one stimulus, however violent, it will usually remain sensitive to others, apparently far less powerful.

Dr. LEIDY exhibited specimens of true bone, found in the kidney of a mink. It was situated in the fibrous tissue of the organ, the glandular substance of which was wasted away, its place being occupied by an enormous parasite, the *Strongylus gigas*.

Dr. WOODWARD stated that he had found tubercular deposits upon the pleura of an opossum, which had been kept in confinement in the Academy for some time.

Dr. HARTSHORNE, from the Committee appointed to devise and report upon a plan for securing a wide circulation of the Memoirs of the Department among medical readers, reported certain resolutions, which were read for the first time.

This Report was adopted.

A resolution was offered by Dr. HARTSHORNE, providing for the appointment of a Committee on Statistics, which was adopted.

The following persons were duly elected members of the Biological Department:—W. M. UHLER, M. D., Prof. J. H. B. McCLELLAN, M. D., Prof. JOSEPH CARSON, M. D., Prof. J. JONES, M. D., Mr. Wm. S. VAUX, T. B. WILSON, M. D., Prof. H. F. CAMPBELL, M. D., and WILLIAM HUNT, M. D.

* The glycerine was thinner than the English Glycerine, (PRICE'S), now in use, and altogether was a much less reliable article. For this reason I do not entirely trust the results observed when using glycerine.